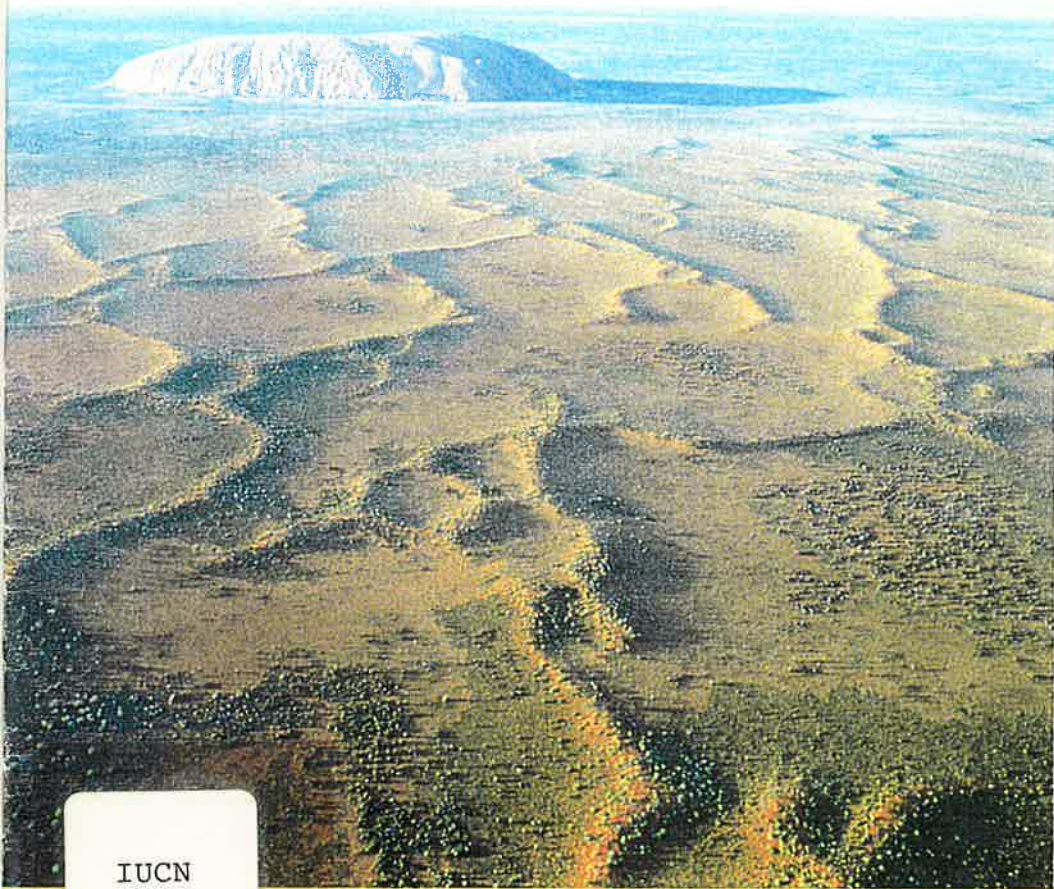

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Cover photo : Magnificent Uluru - Kata Tjuta National Park in the Northern Territory, Australia. An example of a Biosphere Reserve and a World Heritage Area. (photo :- S. Brecken)

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BIOSPHERE RESERVES AND THE IUCN SYSTEM OF PROTECTED AREA MANAGEMENT CATEGORIES

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INTRODUCTION

Over the years, there has been some confusion and uncertainty about the relationship between Biosphere Reserves and the IUCN system of protected area management categories (developed by IUCN's Commission On National Parks and Protected Areas - CNPPA). More than 15 years have elapsed since UNESCO and IUCN last produced a working paper on the two concepts (CNPPA, 1979). The adoption in 1994 of a revised management categories system, by the 19th Session of the IUCN General Assembly, and the publication (CNPPA/WCMC, 1994) of guidelines about that system, suggest clarification of the relationship is timely.

This paper seeks to demonstrate that the IUCN management categories system is not only compatible with the Biosphere Reserve concept, but that it can inform the planning, management and effectiveness of Biosphere Reserves. A two stage approach is recommended in assigning reserves to the IUCN categories. Also, we aim to illustrate by examples the practical application of the revised system of protected area management categories to Biosphere Reserves.

BIOSPHERE RESERVES

Biosphere Reserves are recognised areas of representative environments which have been internationally designated within the framework of UNESCO's Man and the Biosphere (MAB) Programme for their value to conservation through providing the scientific knowledge, skills and values to support sustainable development (Biosphere Reserves Nomination Form, Sept. 1994).

Biosphere Reserves are nominated by national governments but must meet agreed criteria and adhere to a minimum set of agreements before being admitted to the worldwide network. In particular, each Biosphere Reserve should perform three complementary functions: a biodiversity conservation

function (with a focus on conserving a representative sample of major ecosystems); a development function (with a focus on humans in the biosphere, emphasising an integrative role for local communities); and a logistical function (combining conservation research, education, training and monitoring).

Biosphere Reserves are a special kind of conservation area - traditionally a nested series of zones with differing management intensities (core area, buffer zone and transition area, see Fig. 1), designed to include humans within an overall conservation framework. They may comprise any mix of terrestrial and/or marine elements). Some 12% of Biosphere Reserves also include, or are part of, a World Heritage site, Wetland of International Importance (Ramsar site), or both. About 90% of all Biosphere Reserves are covered by a range of nationally designated Protected Areas (National Park, Nature Reserve), although 8% have no nationally designated areas associated with them. While Biosphere Reserves are an agreed international designation, they do not necessarily have the force of national law. Their existence is thus a matter of national, regional and local values, not an imposed exterior arbitrary code.

Over 9 800 protected areas now meet the criteria for inclusion on the United Nations List of National Parks and Protected Areas (WCMC/CNPPA, 1994). These protected areas are found in countries of every political, cultural, social and economic background and with a vast range of physical circumstances ranging from small and crowded to large and relatively unpopulated. The IUCN Guidelines present a classification system, which is inevitably based on compromises to accommodate the different needs and situations of countries and their component communities around the world. The guidelines are designed to aid interpretation and application at the regional and national levels - and provide a global context. The guidelines also have been developed to be equally applicable in the terrestrial and marine environments.

Under the IUCN categories system protected areas are classified according to management objectives. A classification system of this type serves a number of valuable purposes in the international context as it:

- ❖ emphasises the importance of protected areas;
- ❖ demonstrates the range of purposes protected areas serve;
- ❖ promotes the idea of protected areas as systems ;
- ❖ reduces nomenclatural confusion;
- ❖ provides an agreed international set of standards;
- ❖ facilitates international comparison and accounting; and
- ❖ improves communication and understanding.

IUCN first attempted to develop a system of Protected Area Categories in 1978 (CNPPA, 1978). This initial system recognised ten categories, one of which was Biosphere Reserves. However, there were a number of difficulties in

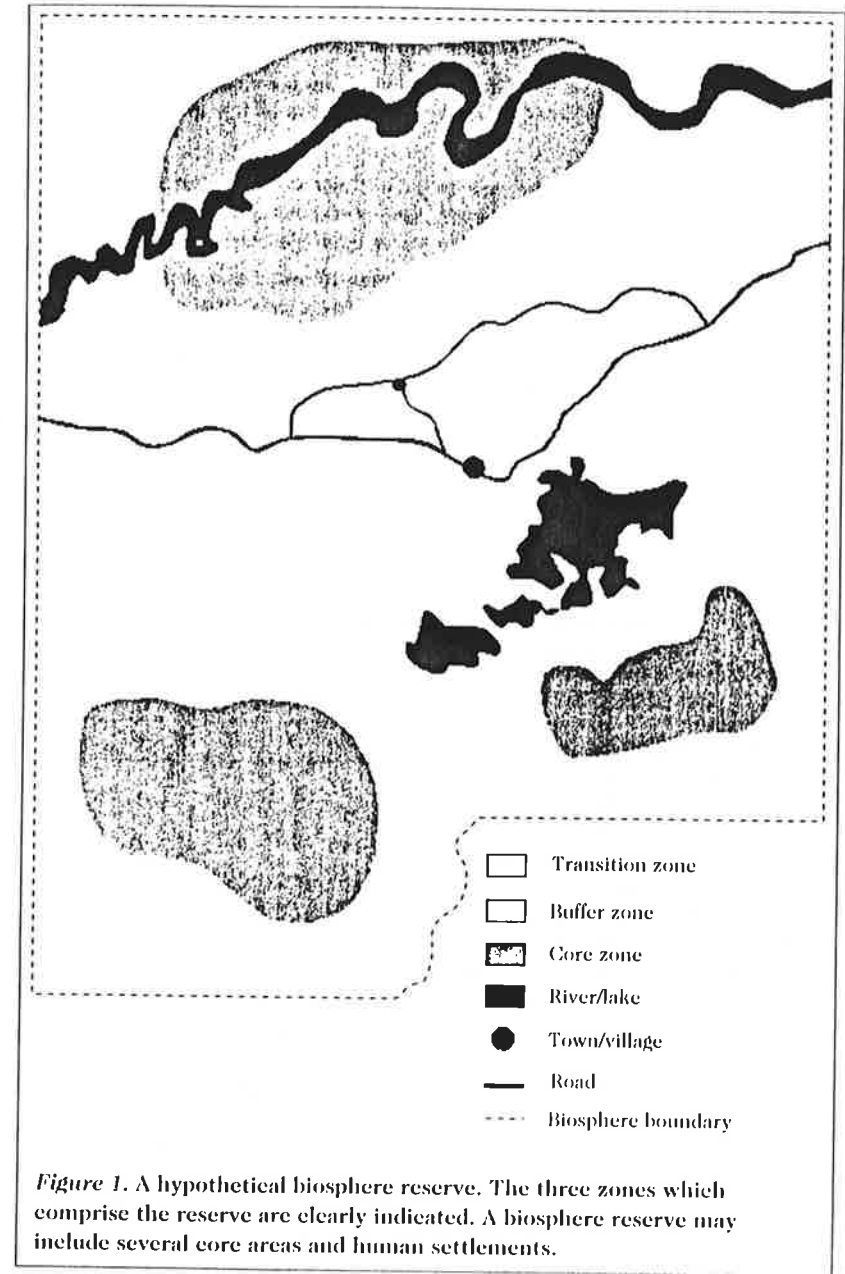


Figure 1. A hypothetical biosphere reserve. The three zones which comprise the reserve are clearly indicated. A biosphere reserve may include several core areas and human settlements.

operating this ten category system. As a result, a participatory review process began in 1984 and involved all members of the CNPPA.

The resulting Protected Area Management Categories system (WCMC/CNPPA, 1994) is based on an agreed definition of a protected area. A protected area is:

An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

Conceptually, this definition encompasses all protected areas. Within this definition protected areas can be divided into six categories as shown in the Annex.

Six principles emerge from the categories system.

1. The basis of categorisation is by primary management objective.

This principle is the most important of all. There are, in fact, a wide variety of potential primary management objectives for protected areas. According to the priority assigned to relevant objectives, a categorisation system logically follows, as the table below shows.

Table 1. Matrix of management objectives and IUCN categories (after CNPPA/WCMC, 1994)

Management Objective	Ia	Ib	II	III	IV	V	VI
Scientific research	1	3	2	2	2	2	3
Wilderness protection	2	1	2	3	3	-	2
Species/genetic diversity preservation	1	2	1	1	1	2	1
Maintenance of environmental services	2	1	1	-	1	2	1
Protection of natural/cultural features	-	-	2	1	3	1	3
Tourism & recreation	-	2	1	1	3	1	3
Education	-	-	2	2	2	2	3
Ecologically sustainable use	-	3	3	-	2	2	1
Maintenance of cultural attributes	-	-	-	-	-	1	2

Key : 1 Primary objective
2 Secondary objective
3 Potentially applicable objective
- not applicable

2. Assignment to a category is not a comment on management effectiveness

The distinction between the primary management objective and the effectiveness of management is often overlooked, and in the past, has led to

confusion. There are, in fact, two separate questions involved. Firstly, what is the aim of management (leads to assignment to a category) and secondly, how well is an area managed (leads to an assessment of management effectiveness)? For instance, where Category II areas have been poorly managed and subjected to inappropriate economic exploitation in the past, some have been re-classified as Category V areas. The IUCN categories system is based on management objective, not actual level of management.

The CNPPA of IUCN currently is developing, in consultation with the World Conservation Monitoring Centre (WCMC), a separate system to assess management effectiveness.

3. The Categories System is International

The IUCN categories system has been designed for global use. The guidance, therefore, is broad and general rather than prescriptive and specific. The system is intended to be interpreted flexibly.

Because the IUCN classification system is based on broad guidelines, it is appropriate that regions or countries should interpret them for their own application. This flexibility allows national relevance to be built into the system. Initial assignment to an IUCN Category, therefore, is a matter for the relevant state or national government. Where there is a difference of opinion, final assignment to Category is an international decision arrived at by the CNPPA with support from other organisations such as WCMC.

4. National Nomenclature May Vary

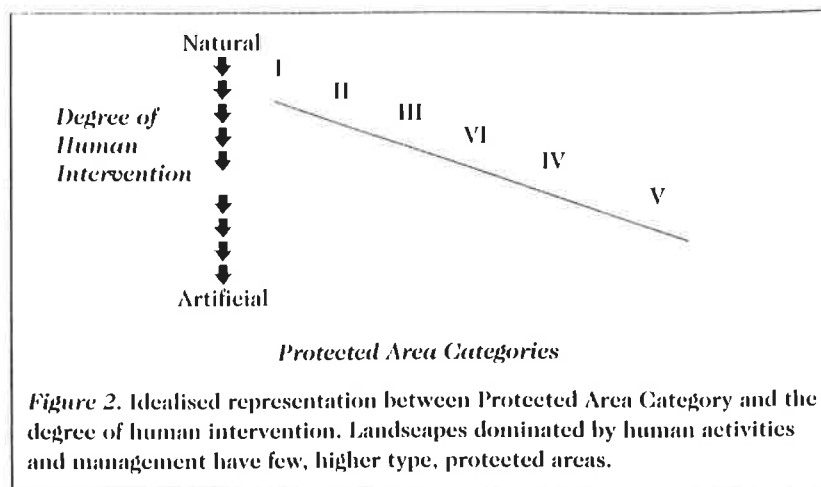
Throughout the world there are hundreds of different designations for protected areas, many enshrined in national legislation. The IUCN Guidelines are not intended to result in the re-naming of these areas, or to replace nomenclature of national significance. National designations, therefore, will continue to mean different things in different countries. It also follows that national designations and titles of IUCN Categories will often differ.

5. All Categories Are Important

All categories are equally important and equally relevant to conservation.

6. The Categories imply a Gradation of Human Intervention

The IUCN Categories imply a gradation of human intervention, ranging from effectively none at all in the case of some Category I areas to quite high levels of intervention in Category V areas. Since Category VI was added to the system later it does not fit neatly into the general pattern, but lies conceptually between III and IV (Fig. 2).



THE CATEGORIES SYSTEM AND BIOSPHERE RESERVES

As mentioned above, in the previous version of the management categories, Biosphere Reserves were identified as a Category in their own right. The 1994 guidelines have not treated them in this way. Why is this?

Protected areas are nationally-designated. The IUCN categories system is a means of classifying them on the basis of management objectives. Biosphere Reserves cut right across this approach because the very concept embodies the idea of a range of management objectives. To classify Biosphere Reserves as just another category as in the earlier classification system, therefore, confuses matters.

On the other hand, Biosphere Reserves often contain a series of management zones with differing management objectives, each of which may correspond to a category in the IUCN system. Some may consist of a number of different land use categories, including protected areas. So rather than being a separate management category, Biosphere Reserves are viewed more accurately as an area of landscape likely to encompass one or more IUCN protected area management categories.

It may indeed be that some Biosphere Reserves contain areas corresponding to all six management categories; and, it would be unusual if a Biosphere Reserve did not include parts which were subject to several different management objectives (indeed they would need to do so in order to meet the concept of a Biosphere Reserve). It may also be that some parts of biosphere reserves may not fit the criteria of a protected area at all. But here we see the

integrative value of the Biosphere Reserve, drawing protected areas into a broader landscape context.

The revised guidelines, therefore, observe that Biosphere Reserves, like World Heritage (natural sites) and Ramsar sites are not a management category in their own right, but an international designation. However, the Biosphere Reserve, or the constituent protected area(s) making up a Biosphere Reserve, would be categorised under the IUCN system according to the rules set out above. In addition, the guidelines comment that:

The following principle should apply: providing that the area is identified under national arrangements for special protection, it should be appropriately recorded under one (or more) of the standard (i.e. six) categories. Its special international status will be recorded (separately), for example, in the UN List and in all other appropriate IUCN publications.

In practice, the situation with regard to Biosphere Reserves and nationally-designated protected areas is very complicated. Some countries have legislation under which they designate Biosphere Reserves. More commonly, the term is applied to pre-existing protected areas designated under national law. In a few cases, the reserves do not include any part of an established protected area. Also, the relationship of boundaries varies greatly. While some Biosphere Reserves, for example, are coterminous in extent with a protected area, sometimes the reserves are larger - and sometimes smaller.

APPLYING THE IUCN CATEGORIES TO BIOSPHERE RESERVES

The determination of the correct IUCN category is normally undertaken by the protected area management authority, based on the IUCN guidelines and subject to endorsement by IUCN/CNPPA. Although this body is often the same as the Biosphere Reserve management authority, in some cases they will differ; where this is so, the two interests will need to agree on the proper categorisation to recommend to IUCN/CNPPA. In either case, the assignment exercise would be assisted by the following guidance.

The IUCN guidelines provide several ways in which the many different situations likely to be found within Biosphere Reserves can be reconciled with the categories system. The approach recommended here involves two stages:

Stage 1: identify whether the whole Biosphere Reserve should be classified under one, or more than one, category.

To do this, it is necessary to establish which of three theoretical possibilities applies:

1. *There is only one management authority for the entire Biosphere Reserve and, for legal purposes, the whole unit is classified by law as having one primary management objective.*

The area would be assigned to a single category.

While the guidelines require that the assignment be based on the primary purpose of management, they also recognise that management plans often contain management zones for a variety of purposes to take account of local conditions. In order to establish the appropriate category, at least three-quarters, and preferably more, must be managed for the primary purpose; and the management of the remaining area must not be in conflict with that primary purpose. It should be noted that a Biosphere Reserve which is equivalent to a single IUCN category does not conform fully to the Biosphere Reserve concept (see CNPPA, 1979). Such cases should promote a re-examination of the Biosphere Reserve to test its effectiveness.

2. *There is one management authority responsible for two or more areas making up the Biosphere Reserve, but each such area has separate, legally defined management objectives.*

The guidelines recognise this situation by acknowledging that "protected areas of different categories are often contiguous, while sometimes one category 'nests' within another". Thus many Category V areas contain within them Category I and IV areas: some will adjoin Category II areas. Again, some Category II areas contain Category Ia and Ib areas.

In this case the legally separate parts of the Biosphere Reserve will be categorised differently.

3. *There are two or more management authorities responsible for separate areas with different management objectives, which jointly make up the Biosphere Reserve.*

Here, too, the correct interpretation of the guidelines would be to categorise these areas separately.

Finally, it should be noted that, in some cases, the management objectives of the transition zone will not accord with the basic definition of a protected area (see above). In such cases, for international accounting purposes, these areas should not be regarded as being in any category of protected area at all.

Stage 2: assignment of parts of the Biosphere Reserve to individual categories.

Assuming that the second or third situations above apply - bearing in mind the purposes of the six protected area management categories and the three zones of Biosphere Reserves - it is possible to draw up a simple matrix

which indicates into which category each zone of the reserve might be assigned. This is shown in Table 2.

Table 2. Relationship between IUCN management categories and Biosphere Reserve zones.

IUCN Protected Area Management Category	Biosphere Reserve Zones		
	Core	Buffer	Transition
Ia	yes	no	no
Ib	yes	no	no
II	yes	no	no
III	yes	no	no
IV	yes	yes	no
V	no	yes	perhaps
VI	perhaps	yes	perhaps

yes = compatibility of management purpose

no = incompatibility of management purpose

perhaps = management purpose may be compatible

In interpreting this matrix, it is necessary to be flexible. There may be some instances where the management objectives of the different parts of the Biosphere Reserves are not clear cut. In other situations, the "fit" between zone and category may not be as neat as Table 2 suggests. The real world is rarely that simple, and Table 2 is no substitute for the requirement to examine closely the management objectives which apply in each case.

Nonetheless, the categories system clearly can be applied to a range of different legal and management situations which characterise Biosphere Reserves in different countries. This is indeed entirely in line with the way in which the system is intended to be applied. To quote from the introduction of the guidelines: "protected areas should be established to meet objectives consistent with national, local or private goals and needs (or mixtures of these) and only then be labelled with an IUCN category according to the management objectives. These categories have been developed to facilitate communication and information, not to drive the system."

BENEFITS

The benefits of a system that can be applied internationally, in a transparent way, are significant. The principal advantage, in the context of this paper, is that it allows global assessments of the existing Biosphere Reserve system. Furthermore it facilitates development and further establishment of a Biosphere Reserve system in which each country can maintain its individual Biosphere Reserve network, yet be clearly part of a global framework. It also

allows the Biosphere Reserve network to relate and contribute to the development of a globally comprehensive, adequate and representative system of protected areas.

Such a system is envisaged by the *International Convention on Biodiversity*.

Article Eight of the *Convention* relates to in-situ conservation and provides, inter alia, that:

"each Contracting Party shall, as far as possible and as appropriate:

- a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;*
- b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity."*

The categories system reminds Biosphere Reserve managers that there are many different aims of protected area management. While typically many Biosphere Reserves have core, buffer and transition zones, the management categories advocated by IUCN signal a wider range of responsibilities, and a broader way of interpreting such management zones. In particular, it offers a way to develop plans for Biosphere Reserves which are management-focused, and which may or may not follow the concentric 3-ring concept. Also, and importantly, it links the Biosphere Reserve network firmly to the Convention on Biological Diversity.

BIOSPHERE RESERVES AND MANAGEMENT EFFECTIVENESS

The main thrust of this paper has been to explain the relationship of Biosphere Reserves to the Protected Area Management Categories. It has been argued that Biosphere Reserves are not a distinct category of protected area and that one must assign the relevant parts of each Biosphere Reserve to one of the management categories based on the particular management objectives.

However, in taking this piece-by-piece approach to Biosphere Reserves we must not lose sight of the special role of Biosphere Reserves in integrating protected core areas with the surrounding lands and uses at the ecosystem level. This involves understanding the regional relationships between human activity and the environment, and encouraging collaboration among all sectors. Integration of this kind on the broader regional level is recognised as being crucial to the survival of protected areas and was a key recommendation of the Caracas Action Plan (IUCN, 1993).

Biosphere Reserve designation is, of course, not the only mechanism by which protected areas can be linked to the surrounding lands and uses. Nor

does the UNESCO designation guarantee that the advantages of this approach will be realised at a particular site. But no matter how it is accomplished, this linkage is one important measure of the management effectiveness of any protected area. It is our hope that the use of the IUCN guidelines in designating new Biosphere Reserves, and in re-defining existing ones, will enhance the effectiveness of Biosphere Reserves.

ACKNOWLEDGEMENTS

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EXAMPLES

EXAMPLE OF SCENARIO 1:

One nationally designated area under a single management authority.

SINHARAJA FOREST RESERVE, Sri Lanka

Designations:- Part of 'Sinharaja Forest Reserve' was originally notified as a forest reserve in 1875 and the rest proposed as a forest reserve in the early 20th Century. The combined area of 8 864ha was designated as a biosphere reserve in 1978 and included within the 11 187ha Sinharaja National Heritage Wilderness Area, notified in 1988 under the *National Heritage Wilderness Areas Act 1988*. That same year Sinharaja National Heritage Wilderness Area was inscribed on the World Heritage List.

Description and values:- Sinharaja is a narrow strip of undulating terrain in the lowlands of Sri Lanka's south-west wet zone. It is the largest tract of lowland rain forest remaining in the country, supporting many nationally endemic species of plants and animals, and a variety of plants of known benefit

to man. About 66% of the total area is primary forest. Over 5 000 people live on the periphery of the national heritage wilderness area, and there are a few families within its boundaries.

Legal basis of management:- Under the *National Heritage Wilderness Areas Act*, Sinharaja is managed by the Forest Department for the preservation of its unique ecosystem and genetic resources. Entry is by permit and restricted to observing the fauna and flora or conducting scientific research. In practice, certain traditional activities, such as entry by villagers and use of certain non-timber forest products, continue and it is recognised that the legislation will need to be amended to permit such practices on a carefully controlled basis.

Management:- Owing to its relative inaccessibility and steep terrain, Sinharaja remained largely undisturbed until the 1970s when some 1 400ha were selectively logged. The Forest Department has since afforded complete protection to the forest, with management directed towards tourism, education and research. Local dependence on forest resources has gradually been transferred to the periphery of the natural heritage wilderness area. Encroachment continues to be the major threat. For example, it accounted for a 12% loss of forest between 1956 and 1983. Local socio-economic problems include lack of educational and health facilities, and declining agricultural productivity from lands used predominantly for tea cultivation, and lack of timber to meet domestic and communal needs.

The objective of the current management plan is to provide for the maximum protection of Sinharaja, while ensuring that the livelihoods and traditional practices of the people in surrounding villages are not adversely affected. The National Heritage Wilderness Area is not zoned as such, although certain areas are used specifically for visitors and scientific research. It is proposed that core areas be defined and strictly protected, and that a buffer zone around the periphery be defined and managed to sustainably improve local livelihoods.

IUCN Category:- Sinharaja National Heritage Wilderness Area qualifies as Category II in view of its ecological integrity, scientific and educational importance, and protected status, with management vested in the highest competent authority. The entire biosphere reserve lies within the national heritage wilderness area and, therefore, assumes Category II status.

EXAMPLE OF SCENARIO I:

One nationally designated area under a single management authority.

WADI ALLAQI CONSERVATION AREA, Egypt

Designations:- Wadi Allaqi was decreed a conservation area under the *Presidential Law Concerning Natural Protectorates No. 102* of 1983. The

entire site, encompassing an area of 27 500ha, was designated part of a very much larger (2 380 000ha) biosphere reserve in 1993.

Description and values:- The Wadi Allaqi basin comprises a group of sediment-filled dry valleys located on the eastern side of Lake Nasser. It is the largest of the numerous wadis flowing into Lake Nasser and has become an important stop-off for many migrant species of birds. The basin contains an abundance of water, diverse flora, fertile soils and minerals which are of fundamental importance to the ethnic groups who are being encouraged to settle there under an Egyptian Government aid program. Most of the reserve's 800 inhabitants belong to the Ababda and Bishari tribes. About 100 reside in the core area of Wadi Eigat, 200 in the buffer zone and the rest in the transition zone. About 100 people visit the biosphere reserve each year.

Legal basis of management:- Under *Presidential Law Concerning Natural Protectorates No. 102*, Wadi Allaqi Conservation Area is managed by the Egyptian Environmental Affairs Agency (EAA) for the cultural, scientific and aesthetic value of its flora, fauna and natural features. Tourist access is prohibited without authorisation from the Military Security and the EAA.

Management:- The biosphere reserve is managed by the EAA. It comprises two core areas, each with its own buffer zone, namely Wadi Quleib (core area - 13 750ha, buffer zone - 16 659ha) and Wadi Eigat (core area - 50 100ha, buffer zone - 115 300ha) and a transition zone (2 184 191ha) that encompasses the whole of Wadi Allaqi and its tributaries. Management objectives include the conservation of genetic resources through the protection of flora and fauna, and ensuring that any development is both sustainable and ecologically sound. Core areas are managed actively for conservation purposes. Activities within the buffer zone include collection of natural products, but not hunting, by local people. There is substantial involvement of local people, with particular emphasis placed on their understanding of vegetation ecology, upon which their survival depends.

The most serious threat to the reserve arises from the abundance of extractable minerals, including copper, chromite, uranium, tale and graphite. There are also extensive reserves of ornamental stone, including seven types of marble and granite, already being extracted by commercial companies. Completion of the asphalt road between Wadi Allaqi and Aswan is likely to make many of the older mines economically viable, thus increasing traffic and disturbance within the reserve.

IUCN Category:- Wadi Allaqi Conservation Area qualifies as Category IV in view of it being actively managed for conservation purposes, with management vested in the government. This part of the biosphere reserve assumes Category IV status. The rest of the biosphere reserve, including core and buffer zones outside the designated conservation area, are unassigned because of their legally unprotected status.

EXAMPLE OF SCENARIO 1:

One nationally designated area under a single management authority - also designated as a World Heritage Site.

ULURU – KATA TJUTA NATIONAL PARK, Australia

Designation Uluru – Kata Tjuta National Park was declared a National Park under Australian Commonwealth legislation in 1977. It was designated as a biosphere reserve in 1977. The national park was inscribed on the World Heritage list for its natural values in 1987 and as a cultural landscape in 1994. The cultural landscape concept for World Heritage is especially compatible with that of a biosphere reserve. In the case of Uluru- Kata Tjuta the population levels in the area are very low, and the protected area Category of II is appropriate.

Description and Values:- Uluru – Kata Tjuta National Park covers 132 566 ha of arid ecosystems and is located 1420 kilometres south of Darwin and 335 kilometres south-west of Alice Springs in the Northern Territory, and 1 270 kilometres north-west of Adelaide in South Australia. It is almost completely surrounded by Aboriginal freehold land. Yulara township, established primarily to provide tourist accommodation, lies to the north on a private lease. At this stage only the park and none of the surrounding land is included in the biosphere reserve. There is a community of about 200 people (the Mutitjulu Community) of Aboriginal traditional owners, its workers and park staff within the reserve.

Uluru – Kata Tjuta National Park represents an outstanding example of Australia's arid ecosystems and the cultural interactions of people and the environment. The arid environments of Australia are remarkable for two things: the extremely low fertility of the soils and extremely variable rainfall. Uluru contains representative samples of these ecosystems and their associated plants and animals, some of which are rare or threatened. The monoliths of Uluru (Ayers Rock) and Kata Tjuta are of outstanding scientific and cultural significance. The importance of the relationship between the indigenous Aboriginal traditional owners and their physical and cultural environment was recognised in 1994 by the inscription of the park as a World Heritage cultural landscape.

Legal basis of management:- The area is declared as Uluru – Kata Tjuta National Park under the provisions of Section 7 of the *National Parks and Wildlife Conservation Act 1975*. The land is owned as inalienable freehold, vested in the Uluru-Kata Tjuta Aboriginal Land Trust, which represents the traditional Aboriginal owners. On 26 October 1985 the land was leased for 99 years to the Director of National Parks and Wildlife, to be managed as a national park. The responsible administration is the Uluru – Kata Tjuta Board of Management and Director of National Parks and Wildlife. The day to day

management is carried out by the Director of National Parks and Wildlife through the Australian Nature Conservation Agency.

Management:- The management of the park is subject to a statutory Plan of Management legally endorsed by the Government of Australia and revised from time to time. The Board and the Director are allowed only to act consistently with this plan. The Board of Management has a majority of Aboriginal traditional owners represented.

The major threats to the park appear to be from ecosystem modification due to the impacts of introduced mammals such as rabbits and cats; the loss of (now substantially restored) traditional burning practices, and the direct impact of tourism on the environment.

IUCN category:- The park is a Category II reserve.

EXAMPLE OF SCENARIO 1:

One nationally designated area under several management authorities.

RESERVA DE LA BIOSFERA DE SIAN KA'AN, Mexico

Designations Sian Ka'an was declared a national biosphere reserve on 20 January 1986 by the Federal Government under the *General Law for Ecological Equilibrium and Environmental Protection*. It was accepted as a biosphere reserve by UNESCO in 1986 and inscribed on the World Heritage List in 1987. It covers a total area of 528 000ha, of which 120 000ha is marine.

Description and values:- Sian Ka'an forms part of the extensive barrier reef system along the eastern coastline of Central America and includes coastal dunes, mangroves, marshes and inundated and upland forests. The site has been described as the largest effective nature reserve in Mexico because forest cover remains intact and it is quite possible that all vertebrate species characteristic of the Yucatan region are present. The reserve is of great cultural value with its 23 recorded Mayan and other archaeological sites. Some 800 people, mainly of Mayan descent, inhabit the reserve.

Legal basis of management:- Under the General Law for Ecological Equilibrium and Environmental Protection, Sian Ka'an fulfils the criteria for national biosphere reserve status because it is larger than 10 000ha, represents a forest and coastal ecosystem that has not been significantly altered by human action, and includes at least one pristine area inhabited by endemic, threatened and endangered species. The reserve is jointly managed by the Mexican Government's Secretaria de Desarrollo Social Instituto Nacional de Ecología (SEDESOL), Quintana Roo's State Government, the Research Centre of Quintana Roo (CIQRO) and Amigos de Sian Ka'an, a non-governmental conservation group.

Management:- The reserve is zoned into a 279 704ha central core area. Objectives include: administration, protection and monitoring, natural resource management, public use and education. Achievements to date comprise: control of immoderate tree felling; a significant reduction in commercial hunting and indiscriminate use of forest products in the core area; establishment of ecological regulations for the relocation of Colonia Punta Herrero, a settlement considerably damaged by cyclones; and the employment of local inhabitants from Chunyaxeche as reserve workers for wild fauna captive breeding projects. However, management is inhibited by a shortage of staff, inaccessibility to some parts of the reserve and undefined boundaries.

The principal threat is from the planned development of tourist facilities. Forest exploitation is generally limited to the collection of useful wild plants and hunting for subsistence, although there is over-exploitation of valuable timber species. Some 135 000ha were affected by forest fires in 1989. Furthermore, the surrounding communities are increasingly abandoning traditional fishing practices in favour of more commercial ones, that in time, may threaten the reserve.

IUCN Category:- Sian Ka'an fulfils the criteria for Category II under its national designation as a biosphere reserve: it protects the ecological integrity of two ecosystems and is managed by the Federal and State Governments, together with a council of indigenous people. Thus, it is also Category II under its international designation as a biosphere reserve.

EXAMPLE OF SCENARIO 2:

Several nationally designated areas under one management authority.

WADDENSEA OF SCHLESWIG-HOLSTEIN, Federal Republic of Germany

Designations The Waddensea of Schleswig-Holstein was designated a biosphere reserve in 1990. Its entire area of 285 000ha comprises the Schleswig-Holsteinisches Wattenmeer National Park, established in 1985 under the *Bundesnaturschutzgesetz* (Federal Nature Protection Act) 1976. The national park contains a number of nature reserves within its boundaries, including Nord-Sylt (1 796ha) established in 1969, Rantumbecken (576ha) in 1962, and Amrum Dunen (728ha) in 1971, as well as other protected areas such as Hamburger Hallig (801ha) and Holsteinische Schweiz Nature Park (58 100ha) established in 1986.

Description and values:- Schleswig-Holstein is a complex of mudflats and marshes. It forms part of the Waddensea, the largest marine wetland in Europe, which is of vital importance for migratory birds, marine mammals and North Sea fisheries. The biosphere reserve also supports thousands of resident waterfowl and several nationally threatened floral and faunal species. It is

representative of a relatively undisturbed coastal ecosystem, there being no permanent inhabitants within the biosphere reserve.

Legal basis of management:- Under the *Bundesnaturschutzgesetz*, the national park provides protection to the variety of native flora and fauna. Public access is permitted where it is compatible with conservation objectives. Similar provisions under the *Bundesnaturschutzgesetz* apply to the nature reserves, including the possibility of public access. The same act provides for nature parks, which are landscapes managed primarily for recreation and tourism. The national park is managed by the regional authority Landesamt Für den Nationalpark Schleswig-Holstein Wattenmeer, but local participation in decision-making is provided through two local councils which have an advisory role.

Management:- The biosphere reserve (and national park) is zoned into core (85 500ha), buffer (6 400ha) and transition (193 100ha) areas. Public access and farming, except restricted grazing to maintain coastal defences, are prohibited in the core areas and only traditional fishing is allowed. Farming is permitted in the buffer zone, provided it is not detrimental to wildlife. Economic activities such as sand extraction, harbour development and recreation are allowed in the transition zone. Hunting is prohibited in the core areas, but permitted under licence in the buffer and transition zones. Seal hunting is allowed only for scientific purposes. In 1987, the Waddensea States established a common secretariat for more effective protection of the Waddensea.

Human activities such as increased tourism, air traffic, military activity, and fishing disturb the birds and seals. Dyking, mainly for coastal protection and acquisition of fertile agricultural land, has reduced the area of salt marsh. Contamination by heavy metals and other toxic substances from inflowing rivers and the atmosphere, and overloading of nitrogen and phosphate are problems. Although oil exploration is generally not permitted, a licence for a drilling platform has been issued at Hakenland.

IUCN Category:- Schleswig-Holsteinisches Wattenmeer National Park qualifies as Category V, being a protected landscape of high biological value which has been subject to traditional patterns of use over time. The biosphere reserve, therefore, assumes Category V status. Within the national park and biosphere reserve, however, there are nationally designated nature reserves¹ and nature parks which may qualify for other categories depending on the integrity of their habitats and management objectives.

¹ Nature reserves are classified as Category IV in the 1993 *UN List of National Parks and Protected Areas* under the old categories system, but this category is not applicable under the new system.

EXAMPLE OF SCENARIO 3:

One nationally designated area and an unprotected area under separate management authorities.

MOUNT KULAL BIOSPHERE RESERVE, Kenya

Designations:- Mount Kulal was designated a biosphere reserve in April 1978 and covers an area of 700 000ha. The reserve includes South Island National Park (3 880ha), established in 1983 under the *Wildlife (Conservation and Amendment) Act 1979*.

Description and values:- The reserve is rectangular and extends from the centre of Lake Turkana to the Chalbi Salt Desert in the east. It includes the volcanic South Island and Mount Kulal. Vegetation ranges from mountain forest to desert and includes a montane zone with rainforest, mist forest and grassland. Several threatened faunal species occur within the reserve. There is archaeological evidence of former pastoral and fishing populations near the old Chalbi Lake. Three ethnic groups live within the reserve, namely 1000 Samburus on Mount Kulal, 1 000 Turkana around Loiyangalani and 300 El Molo on Lake Turkana.

Legal basis of management:- The national park is managed by the Kenya Wildlife Service under the *Wildlife (Conservation and Amendment) Act*, for the protection of its flora and fauna. The rest of the biosphere reserve is not legally protected, but is owned by Marsabit County Council.

Management:- Mount Kulal Biosphere Reserve has been the study area of the UNEP/MAB Integrated Project in Arid Lands, which is concerned with investigating desert encroachment. The project's main objective is to produce comprehensive management guidelines on land-use strategies and alternative economies which will provide for rehabilitation of degraded lands and a living for the region's expanding population. The first priority is to conserve existing resources and prevent further ecological and social degradation. It is anticipated that the present research program will create the framework for an institution to monitor the project area as an example of East Africa's arid zone. The District Development Committee oversees implementation of the management plan. There is a central core zone of 1 100ha.

The main human impact is tree felling for fuel and timber to construct houses and enclosures for livestock. The montane and sub-montane forests on Mount Kulal have been reduced and forest regeneration is hindered in several areas by removal of the understorey. Other problems include periodic droughts, grass fires started by pastoralists, and overgrazing caused by restricting the movements of nomadic peoples and settling them and their livestock.

IUCN Category:- South Island National Park qualifies as Category II: it is a protected natural site of international importance with management ultimately

vested in the highest competent authority. This part of the biosphere reserve, therefore, assumes Category II status. The remaining area may not qualify for any category, despite being a predominantly natural system that provides a sustainable flow of resources to meet community needs, because it has not been designated as a protected area under national legislation. However, it could qualify as Category VI if its international status as a biosphere reserve assured its long-term protection at the national level, with management undertaken by a body having an unambiguous remit for conservation and in partnership with the local community.

EXAMPLE OF SCENARIO 3:

Two nationally designated areas under two management authorities.

LAKE BAIKAL REGION BIOSPHERE RESERVE, Russian Federation

Designations Lake Baikal Region, covering a total of 559 100ha, was designated a biosphere reserve in 1986. It comprises two isolated zapovedniks (state nature reserves), namely Barguzinskiy (263 176ha) along the lake's mid-eastern shores and Baikal'skiy (165 724ha) on the southern shores. Both sites were established by Order of the Council of Ministers, RSFSR in 1916 and 1969, respectively. Legal provisions for zapovedniks are now covered by the *Law on Environmental Protection 1991*.

Description and values:- This is a mountainous region, with both flat-topped and conical summits separated by long valleys. Steppe communities occur in the valleys and taiga forest on the mountain slopes. Lake Baikal is the world's deepest lake and two-thirds of the species found here are endemic, the most notable being the Baikal Seal. Barguzinskiy Zapovednik was originally created to protect the Barguzin subspecies of Sable.

Legal basis of management:- Under the *Law on Environmental Protection* the zapovedniks are managed by Goskompriroda (Ministry of Environmental Protection and Natural Resources of Russia) to protect threatened flora and fauna, and serve as outdoor laboratories for scientific research. Recreational activities are strictly limited. Zapovedniks are surrounded by an area of semi-protected land which provides a buffer to the adjacent countryside. The surrounding buffer is thought to be managed by the local authority.

Management:- The biosphere reserve is zoned into two strictly protected core areas, comprising both zapovedniks, where all economic activity is prohibited and access is restricted, and two buffer areas (33 776ha around Baikal'skiy and 94 424ha surrounding Barguzinskiy), where economic activities compatible with the preservation of the landscape are permitted. Research activities, coordinated by the Russian Academy of Sciences, have included monitoring ecosystem changes to the terraces bordering southern Baikal and the Khamar-

Daban mountain range, climate, vegetation and the harvesting of animal populations. Specific research is conducted on the conservation and sustainable use of Sable.

Forest fires are a constant threat. Smoke from a paper mill, some 50km from Baikal'skiy's western boundary, has affected forest on the Khamar-Daban mountain range. There is growing concern about the state of Lake Baikal. Many scientists believe that the lake is becoming excessively polluted from various industries sited along its shores.

IUCN Category:- Barguzinskiy and Baikal'skiy Zapovedniks both qualify as Category Ia in view of their outstanding ecosystems which are preserved in an undisturbed state, with access limited to scientific research and management vested in the highest competent authority. These parts of the biosphere reserve, therefore assume Category I status. The buffer zones surrounding each zapovednik may qualify as Category VI, given their 'semi-protected' status under the national legislation and if their biosphere reserve designation confers long-term protection at the national level. Further clarification is needed.

EXAMPLE OF SCENARIO 3:

Several nationally designated areas under various management authorities.

RESERVE DE LA BIOSPHERE DE CHARLEVOIX, Canada

Designations Charlevoix, covering 460 000ha, was designated a biosphere reserve in 1988. It encompasses a number of protected areas established under federal and provincial legislation, namely: Cap Tourmente National Wildlife Area (2 230ha) established in 1978 under the *Canadian Wildlife Act* 1973; Grands Jardins Provincial Park (31 000ha) in 1981 under the *Provincial Parks Act*; and Hautes-Gorges-de-la-Rivière Malbaie Nature Park (23 300ha), Port-au-Saumon Conservation Area (95ha), Palisades Forest Education Centre (2 656ha) in 1972, and Montmorency Forest Training and Research Centre (6 665ha) in 1987 under various other provincial laws.

Description and values:- Charlevoix, an area of undulating hills and mountains, straddles two main geographical regions: the Charlevoix coast and the Massif des Laurentides. It is important for its unique geological features, diverse flora and fauna, internationally important wetland, population of internationally threatened whales and regionally threatened ecosystem. Although there are no permanent settlements within the five core areas, some 30 000 people live within the buffer zone and another 2000 in the transition zone.

Legal basis of management:- Under the *Canadian Wildlife Act*, Cap Tourmente National Wildlife Area is managed by the Canadian Wildlife Service for the conservation of migratory species and their habitats. Limited human

interference may be permitted. Under the *Provincial Parks Act*, Grands Jardins Provincial Park is permanently protected as representative of some of Quebec's natural regions, with access provided to the public for education and outdoor recreation. It is under the jurisdiction of the provincial Ministère du Loisir, de la Chasse et de la Pêche. Palisades Forest Education Centre and Hautes-Gorges-de-la-Rivière Malbaie Nature Park, as well as all public forests, are under the provincial Ministère de l'énergie et des Ressources. Port-au-Saumon Conservation Area is owned and managed by a private Corporation du Centre écologique de Port-au-Saumon, and Montmorency Forest Training & Research Centre by the Université Laval du Québec. The Ministère de l'agriculture, des Pêche, et de l'alimentation du Québec controls agriculture and fisheries, whilst the Ministère de l'environnement du Québec is involved in monitoring pollution and the quality of the environment.

Management:- The main objective is to integrate protection of the natural landscape and wildlife with the development of rural agriculture through local participation and education. There are five core areas totalling 63 400ha (Grand-Jardins Provincial Park, Hautes-Gorges de la Rivière Malbaie Nature Park, Montmorency Forest Training & Research Centre, Port-au-Saumon Conservation Area, Palisades Forest Education Centre) and a buffer zone of 393 400ha. Permitted activities in specified zones range from agriculture and forestry to livestock rearing, hunting and fishing, tourism and settlement. Permits are required for hunting and fishing within core areas. Lack of coordination between the various provincial and national management authorities is a constraint.

Pollution is a major threat to Charlevoix. The St Lawrence River is polluted by an estimated 2 300 companies, resulting in extremely high levels of heavy metals, organochlorides and polychlorinated biphenyls.

IUCN Category:- Cap Tourmente National Wildlife Area qualifies as Category IV, being an important wildlife area under a federal authority that is subject to active management. Grands Jardins Provincial Park qualifies as Category II in view of it being representative of a major ecosystem, with management invested in the provincial government. Hautes-Gorges-de-la-Rivière Malbaie Nature Park qualifies as Category V on account of its landscape qualities. Port-au-Saumon Conservation Area, Palisades Forest Education Centre and Montmorency Forest Training & Research Centre were classified as Category IV under the old IUCN system, but this category may no longer be applicable to all of these protected areas under the new system.

The biosphere reserve assumes the categories of its respective nationally designated protected areas, most of which constitute its core areas. Those parts of its buffer and transition zones which are not protected areas are not assigned a category.

ANNEX

The Protected Areas Management Categories System

- I Protected areas managed mainly for: (Ia) science or (Ib) wilderness protection (*Strict Nature Reserves and Wilderness Areas*)
- II Protected area managed mainly for ecosystem protection and recreation (*National Park*)
- III Protected area managed mainly for conservation of specific natural features (*Natural Monument*)
- IV Protected area managed mainly for conservation through management intervention (*Habitat/Species Management Area*)
- V Protected area managed mainly for landscape/seascape conservation and recreation (*Protected Landscape/Seascape*)
- VI Protected area managed mainly for sustainable use of natural ecosystems (*Managed Resource Protected Area*)

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